

their forms began to change in a wavy manner, and in a short time vanished as in ether from that part of the sky. The sun was now at a slight altitude, and when I turned round I saw to my astonishment similar clouds, though the colours were less distinct, in the north-west, where a few minutes previously none were to be seen. These did not last long, though during their short appearance their outlines were very distinct, there at the time being a heavy haze of reddish gray, changing to dusky carmine above the northern horizon. At this time a west wind was blowing with considerable force, but these clouds appeared to be high above the wind, as they were certainly not influenced by it. In mid-air there seemed to be a counter current, as light cirrus cloud-streaks drifted slowly across the zenith from the east. About 4 p.m. the same phenomenon occurred in the west and north-west, the clouds, if anything, being more beautiful than in the morning. They remained for a time after the sun had set. At 5 p.m. the thermometer registered 12° of frost. I trust I have succeeded in a partial way to convey some idea of sky effects so inexpressibly beautiful as to baffle description. I was informed last night that the previous Monday afternoon, as a party of noblemen and gentlemen were returning to Tynehead Station from a day's shooting on the Humber Estate, in East Lothian, and while a terrific storm of wind and sleet prevailed, there was a sudden rift, through which the party saw a number of clouds of a similar nature to those I have attempted to describe.

JOHN THOMSON

Maxton, Wednesday Afternoon

At 3 p.m. we have had a steady fall of snow for four hours.

JOHN THOMSON

Wick, December 30, 1885

SIR,—Your correspondent "C. M." in to-day's paper exactly describes the phenomenon as it was seen here. The cirrus clouds were probably floating at a very high elevation in a stratum of air much below the freezing-point, and their structure thus having undergone some change, the sunlight became decomposed, causing the prismatic display. This theory may or may not be correct, but the end of the cirrus band farthest from the sun lost the colours first, and the end nearest the sun was the last on which a vestige remained after the sun had set.

NEMO

Sunderland, December 30, 1885

SIR,—I have just read in to-day's *Scotsman* the letters of your correspondents in Fraserburgh and Edinburgh concerning the atmospheric or cloud phenomena of Monday, 28th. The appearance of the heavens here from 3.30 p.m. was most striking. The sun set in a rich water-glow, and the sky in the west being very free from obscuration, we could notice how the glow deepened as it ascended, until from 20° to 50° it presented a dark crimson or purple. Just above Venus—which was like a silver ball—there were seen some cirro-stratus clouds—bright and luminous—just like illuminations on a dark ground. They were stationary, and retained their shape for a very long time. At their western extremities were seen all the prismatic colours, as if they were encircled with rainbows. These colours were very distinct for half an hour, and then gradually disappeared; but still the clouds remained, and were seen at 5.20—almost in their original position—as bright electric clouds. I have observed the heavens for thirty years, but never saw so beautiful a cloud-display. I think the explanation is that the various strata of the atmosphere retain certain rays of light longer than usual when the sun's light falls at the oblique angle it has in December. These clouds evidently rested in a part of the atmosphere not affected by the disturbances nearer the earth.

D. PATTERSON, M.A.

ON going out at 4.12 p.m. to-day, I saw several remarkable clouds in the west part of the sky, somewhat similar to those described by Prof. Piazzì Smyth and several other correspondents in *NATURE*, vol. xxxi. pp. 148, 192, 264, 315, 338, 360. These clouds were collected in three groups, about south-west, west, and north-west respectively. Some of them were streaked, and the streaks and longer axes of all the clouds were directed approximately towards the spot where the sun had recently set. At the time when I first saw them, only one of these clouds showed prismatic colours, but I am informed by a friend that a little earlier, about 4 p.m., this was the case with

several. As the other two sets showed colours and changes exhibited later on by those in the south-west, I propose to describe the latter alone.

At 4.12 this group consisted of two large clouds and several smaller ones, just above the planet Venus, the centre of the group being at an altitude of about 30°. The uppermost cloud was about 20° in length and 5° in breadth. Its longer axis was directed towards, but slightly above, the point in the horizon where the sun had just set. The west end of the cloud was rounded, almost semicircular, and hazy near the edge. Then followed two or three fringes, also nearly semicircular, showing rather bright prismatic colours, the blue side of each fringe being towards the sun. The coloured fringes occupied about a third of the cloud; the rest of it was bright, with a slightly greenish tinge, as were also the other clouds of this group. The east end was drawn out in striæ parallel to the longer axis of the cloud. Soon after my first seeing them, the prismatic colours began to fade, and by 4.20 were no longer distinguishable, but the clouds themselves were still bright and noticeable. At 4.25 the cloud that had the prismatic fringes became very faint and had now a slight rose-coloured tinge; the others had the same tinge of colour, but remained bright. By this time the striæ at the east end were drawn out in the direction of the length of the cloud, but became gradually fainter, and by 4.27 had disappeared; so that the cloud was now reduced to about half its original length, the remaining part having at the same time become broader, brighter, and of a deeper rose-colour. This colour, however, soon began to fade, and by 4.34 was nearly gone, though there was no apparent diminution of brightness. At 4.41 they were bright and of a grayish-white, almost steel-gray, colour, and continued so for some time. During all the time I watched them (about three-quarters of an hour) this group as a whole was nearly stationary, though the clouds themselves changed considerably in form and slightly in their relative positions. The sky was almost clear, but near the horizon there were some dark, heavy clouds, and at one time (4.25) several of these, driven by a strong wind, passed rapidly below the group above described, partly covering the lowermost. On going out again at 6.20 to watch them, I found that they had all disappeared. I may add that yesterday evening, soon after sunset, the western sky was covered with a rosy flush, reminding one slightly of the wonderful sunsets of two years ago.

CHARLES DAVISON

Sunderland, December 28, 1885

YESTERDAY morning (December 29), from about 8.30 to 9 o'clock, a number of very brilliantly-coloured clouds were observed here by myself and others. The weather was cold and frosty, and the sky at the time was clear with the exception of a thick haze round the horizon; a few clouds were thinly distributed over the sky, and these were more or less coloured. The clouds in the south-east had colours rivaling those of the rainbow in intensity. The colours were also distributed in bands, though not in the same order as those of the rainbow. The clouds in the opposite quarter of the sky were smaller, and though unusually bright as regards luminosity the colours were paler than on the other side of the sky. Each cloud also had one uniform tint, a pale green or blue or pink. The more brilliant clouds while fading assumed an appearance similar to these others, some of the bands broadening out, while others disappeared. I saw a beautiful iridescent cloud here at the same hour one morning last December. At that time the phenomenon was generally observed throughout the country, as is evident from the letters which appeared in *NATURE* (vol. xxxi. pp. 148, 192, 264, &c.).

JOHN STEVENSON

Broxburn, December 30, 1885

The Recent Star-Shower

MR. DENNING's letter of December 12 makes me see that I did not put the point which was in my own mind with sufficient clearness in my letters of December 7 and 8.

It was not to coincidences of star-showers with displays of auroræ as to whose true auroral nature there appeared to be no question, that I wished to draw attention, but to the fact that, among the instances to which I referred, of the coincidence of such showers with *aurora-like phenomena*, there were two occasions, and those two occurrences of the same shower, on which there was a notable absence of any magnetic disturbances. The coincidence of such disturbances with auroral displays is, I

suppose, so thoroughly established that the notable absence of them on these occasions may fairly be taken to suggest a possibility that the phenomena were not truly auroral. If so, their coincidence with the star-shower becomes more noteworthy.

Rugby, January 5

J. B. HASLAM

A SPLENDID shower of meteors occurred on the night of November 27, 1885. Seen from Ava, near Mandalay, at 10 p.m. mean time of place, the point of emergence was near the zenith, and the shower radiated to each point of the horizon. The rate at that hour was 450 to 600 per minute, as near as I could judge lying on my back on the steamer's awning. It is probable, however, that I missed a great many. The point of emergence was at one-fifth the distance from γ Andromedæ (Almach) towards β Andromedæ (Mirach). The following night the shower was still plentiful, but I did not count them. The nights have been very clear and beautiful here.

December 1, 1885

ALFRED CARPENTER

Deposits of the Nile Delta

IN the abstract of the Report of the Committee of the Royal Society, on recent borings in the Nile Delta (*NATURE*, Dec. 10, 1885, p. 142), there is a reference to my "Notes on the Geology of the Nile Valley" (*Geological Magazine*, 1884), which calls for some explanation in the interests of Egyptian geology. When I saw a portion of the borings in Cairo, in the early part of 1884, the work had extended to a depth of only about 40 feet. At a depth of between 30 and 40 feet the boring-rod, after passing through continuous Nile mud, had entered into quicksand, consisting of polished and rounded grains of quartz and other hard rocks (desert sand), and the difficulties incident to this material had for the time arrested the operations. In connection with this and with the insufficiency of the funds on hand for overcoming the difficulties of the work, I wrote a letter at the time to the President of the Royal Society, strongly urging an additional grant, in order that greater depths might be reached.

I then believed, and still believe, that the quicksand marks the true base of the modern Delta alluvium, and corresponds with the similar sand which in certain parts of the Delta protrudes itself from beneath the fluvial deposit. I did not, however, suppose that this sand rests directly on the rocky floor of the valley. On the contrary, as might be inferred from my short statement in the *Geological Magazine* (July 1884, p. 292 and footnote), I anticipated that below the sand would be found the Pleistocene clays, marls, sands, and concretionary limestones of the "Isthmian" formation seen at El Guisr on the Suez Canal, and the equivalents of which rise from under the alluvium in several places on the sides of the Nile Valley. These also constitute the lower strata of the borings reported by Figari Bey; and it appeared to me that in the colour and texture of the sediment mixed with the lower samples of the sand there were indications of the approach to these deposits.

Though I have not seen the borings between 40 and 80 feet, I still think that the question whether these are modern, or belong to the Pleistocene, remains to be disposed of, and will require comparison of the lower samples, if they can be separated from the mud and sand introduced from above, with the overlying deposit. This may have already been attended to, but if so, the fact is not stated in the published abstract. With reference to such comparisons I would ask particular attention to the chemical character and depth of the specimens containing calcareous concretions, which are characteristic of the Isthmian rather than of the Nilotic formation.

Of course I do not affirm that the modern deposit of the Delta is in no place thicker than 40 feet, on the contrary, on my view of the history of the district, there must be old buried channels of the Nile in which it is much thicker, but it should be possible to recognise these by the character of the material filling them.

The softness of the Nile water and the minutely arenaceous character of the Nile mud, as well as the connection of this with its fertility, have been remarked from the most ancient times; and the microscopic details given by Prof. Judd have done much to give precision to our views on these points. With respect however to the causes and geological significance of these phenomena, the conclusions stated in the abstract seem open to serious objections, suggested by the physical features of the area drained by the Nile, and the conditions under which the fluvial deposits are laid down. As this subject is of some

importance both with reference to the geology of Egypt and general geology, I would ask your permission to refer to it in a second short communication.

J. WILLIAM DAWSON

McGill College, Montreal, December 24, 1885

The Discovery of the Source of the Mississippi

IT is a matter of little importance or interest in what spot is located the ultimate spring of the longest branch of even the greatest river. Especially is this the case with the Mississippi, where it may easily be an open question which of a dozen branches is the longest, when traced through its innumerable lakes and windings. By common consent, however, a certain branch of the Mississippi has been assumed as the river proper, and its head as Lake Itasca, in northern central Minnesota. The river was explored to this point, and the lake discovered in 1832 by Schoolcraft, who published a map of the lake, and of the river from this point downwards. He spent but one night on the lake, and did not explore its tributaries. Four years later Nicollet led an expedition to the head waters of this stream, reached Lake Itasca, and spent several days in making a thorough exploration of the country about it. In his narrative, published in 1841, he gives a full description of the tributaries to the lake which constituted, according to general acceptance, the extreme head waters of the river. The report is accompanied by a map, on which the geographic features described in the narrative are delineated, and which agrees in general with later and more accurate maps.

During the half century which has passed since the time of these explorers, settlement has crowded upon this region, railroads have been built in close proximity to it, and the country has been explored in every direction in the interest of the lumber industry. Furthermore, in 1876, the surveys of the General Land Office were extended over it. Lines were run at intervals of a mile over the whole region, and every lake and pond of any importance was mapped by traverse survey. In short, the country has long since ceased to be a *terra incognita*.

It is therefore with astonishment, not unmixed with a feeling akin to disgust, that we read in the daily papers, in certain magazines, and finally in the *Journal of the Royal Geographical Society*, an account of the alleged "discovery" of the source of the Mississippi, made by a Capt. Glazier, in the summer of 1881. It appears from his narrative, published in great fulness of detail in the *American Meteorological Journal*, September to December, 1884, that his expedition started at St. Paul and pushed its way manfully by rail and stage to the Leech Lake Indian agency. After obtaining at this place a full complement of men and material (except provisions) for a life in the wilderness, they started westward for Lake Itasca. They fortunately escaped all the perils of the journey, and arrived there on the third day safely. Coasting along the shore of the lake, they found a stream coming in at the head of the south-west arm, up which they journeyed, some two hundred yards, when they entered a second lake, which Capt. Glazier claims to be the ultimate source of the Mississippi, and to which, probably in virtue of his heroic achievement in being paddled to it, he claims the right to give his own name. The failure of provisions prevented him from making any further exploration or discovery, and the expedition returned to settlements.

It appears from the explorer's description and from the extremely incorrect map which accompanies his narrative—made, as he naively informs the reader, from information furnished by his Indian guide—that his so-called Glazier Lake is identical with a lake in Township 143 north, Range 36 west, which had been carefully mapped by traverse survey by the General Land Office in 1876, or five years prior to his "discovery." This lake, or pond, has an area of about half a square mile. On the Land Office plat it is called Elk Lake, and its connection with Lake Itasca is plainly indicated. By a mere inspection of this plat Capt. Glazier might have made his discovery, and thus have avoided all the hardships and labours of his perilous journey. Since his claim to the discovery of this lake must be considered as altogether baseless, his desire that his name shall be for ever associated with it as the source of the Mississippi River is preposterous, especially as he cannot be ignorant of the above facts.

HENRY GANNETT

Washington, D.C.

Chatoderma

YOUR biological readers will probably be interested to learn that I dredged a specimen of *Chatoderma* last August off the